$30.00

www.WhitakerBrothers.com

CUMBERLAND®

Operation and Installation Manual
6500 Series Granulators

Important! **Read Carefully Before Attempting to Install or Operate Equipment**

Write down your granulator _____ _____

serial numbers here _____ _____

for future reference _____ _____

_____ _____

Cumberland can advise you on proper selection and sizing of systems for your operating environment.

Cumberland is committed
to a continuing program of product improvement.
Specifications, appearance, and dimensions described in this manual
are subject to change without notice.

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Safety Considerations

Cumberland . granulators are designed to provide safe and reliable operation when installed and operated within design specifications, following national and local safety codes.

To avoid possible personal injury or equipment damage when installing, operating, or maintaining this granulator, use good judgment and follow these safe practices:

- ☑ **LEARN AND OBEY** your company's safety policy regarding granulating equipment.
- ☑ **MOVING OR LIFTING THE GRANULATOR**: Although our equipment is built and engineered for great ruggedness in operation, care must be taken when moving the machine along the floor or lifting it. Damage may occur to sheet metal covers, electrical cabinets, or small brackets if pressure is applied to them when moving the granulator. When lifting the granulator, be certain of total machine weight and the capability of the lifting equipment (see the Granulator Specification Sheets for machine weights and dimensions).
- ☑ **GRANULATOR LOCATION**: Adequate area for routine maintenance should be provided in order to open the machine for knife, screen, or cleanout service. Proper service area clearances also should allow people who are working on the machine to be clearly visible to others, thereby reducing the potential safety hazards.
- ☑ **SAFE HOUSEKEEPING**: The work area must be kept clean and uncluttered to allow personnel safe movement around the granulator during periods of operation or maintenance. No hand tools or other metal objects should be left on or about the machine. Any tools or other metal objects which mistakenly fall into the hopper feed opening can cause severe damage to internal cutting chamber and screen chamber components.

☑ **SAFETY GLASSES OR A FACE SHIELD MUST ALWAYS BE WORN** when servicing or operating the machine. Although our machines are designed for the maximum in flyback control, caution must be used when operating near the area of the hopper feed opening in order to guard against unexpected material flyback.

☑ **EAR PROTECTION** may be required when operating the machine during granulation or very hard/noisy materials. The Occupational Safety and Health Act of 1970 has established guidelines for Permissible Noise Exposures (OSHA 1910.95) that should be followed.

☑ **NEVER** attempt to operate the granulator unless it is fully assembled with all guards and interlocks in place and functional.

☑ **OBSERVE** all danger, warning, caution and safety labels on the equipment.

☑ Upon completion of any machine maintenance, be certain **ALL SAFETY GUARDS AND COVERS** are securely and properly fastened prior to resuming machine operation. All fasteners must be in place and properly tightened. **ANY SHORTCUTS MAY RESULT IN INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT.**

☑ **NEVER** wear any loose fitting clothes, neckties, or dangling items such as earrings, belts or shoestrings. Jewelry such as wristwatches, bracelets, or rings should **NEVER** be worn. Long hair must be tied back or placed in a tight fitting hairnet. **NEVER** lean against or rest hands/feet on the granulator when it is in operation or open for maintenance. **NEVER** stand on the granulator when it is in operation.

☑ **ROTATION OF MOTORS**: All rotating items in the granulator are clearly marked on the machine. Always check for proper rotation of motors.

☑ **ELECTRICAL GROUNDING**: All electrical equipment on the granulator must be grounded in accordance to all local codes and Article 250 of the National Electric Code.

☑ ALWAYS **DISCONNECT** AND **LOCKOUT** THE MAIN ELECTRICAL POWER TO THE

GRANULATOR BEFORE PERFORMING ANY SERVICE.

☑ **SAFETY INTERLOCKS MUST NOT BE BYPASSED**. The mechanical and electrical safety interlocks ensure the safety of personnel. They should never be tampered with or removed for **ANY** reason. They should be frequently checked by a qualified mechanic for proper operation.

☑ **NEVER** modify the machine configuration or any individual component without written consent from Cumberland .

For further information on granulator safety, installation, and operation, see the *American National Standard for Plastics Machinery - Granulators, Pelletizers, And Dicers Used For Size Reduction of Plastics - Construction, Care, and Use*. ANSI B151.11-1982.

Cumberland has long recognized the importance of safety and has designed and manufactured it's equipment with operator safety as a prime consideration. As a user, we expect you will abide by the foregoing recommendations in order to make operator safety a reality.

SAFETY IS NO ACCIDENT

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1 General Information

1-1 Introduction

This manual is intended to be used as a guide and reference for personnel who will be installing, operating, and maintaining the Cumberland 6500 Series Granulator. The purpose is to aid these individuals in applying efficient, proven techniques, which will enhance productivity.

This Introduction includes a brief functional description, a physical description, and machine specifications for these granulators. Additional sections within the manual provide instructions for installation, pre-operation, preventative maintenance, and corrective maintenance.

Section 2, Shipping Information, includes all required data for receiving, unpacking & inspecting the granulator. Section 3, Installation, provides information on the proper setup of the granulator. Also included are illustrations, which will aid in utilizing techniques to accomplish these tasks efficiently. We can provide the assistance of a factory trained technician, for a nominal charge, who will help in training your operator(s).

Pre-operation Instructions include procedures, checks, and adjustments, which should be followed before commencing with operation of the granulator. These instructions are intended to supplement standard shop procedures performed at shift, daily, and weekly intervals.

The Troubleshooting Section is intended to serve both as a guide for identification and location of most common problems and as a source of detailed assembly and disassembly instructions for those areas of the equipment requiring service.

The Spare Parts Section contains a partial list of recommended parts, which may require replacement. Refer to the Spare Parts Manual for a comprehensive listing of components, which can be purchased.

1-2 General Description

Cumberland granulators are designed to uniformly and consistently size reduce your scrap. They have been engineered to consistently deliver clean granulate with a minimum of “fines”.

The rotor, on which the cutting knives are mounted, is a fabricated steel unit supported by bearings mounted outside the cutting chamber. A motor drives the rotor, which is capable of producing high torque loads. The granulator is equipped with a magnetic starter that is protected by manually resettable overload heaters. The slanted rotor knives produce a scissors cutting action which reduce the possibility of feedstock jamming in the cutting chamber.

Motors are individually fused for maximum protection in compliance with the National Electric Code.

The control enclosure houses all of the necessary wiring, fuses, overload heaters, motor starter coils, along with the 115V control transformer and granulator operating controls. The control enclosure is built to meet NEC, JIC (M.T.), and ANSI-B regulations.

1-3 Granulator Specifications

Model		6 ½ Series		
		6508	**6512**	**6516**
Price by TEFC motor hp	3 hp	✓	✓	✓
	5 hp	✓	✓	✓
Cutting chamber opening in inches: H x W		6.5” x 8”	6.5” x 12”	6.5” x 16
D2 Rotor and Bed Knives		✓	✓	✓
Standard (with rotating end discs) 3 rotating – 2 stationary		Standard		
Cutting circle diameter, in inches		6.3”		
Open screen area in square inches		39 sq. in.	55 sq. in.	70 sq. in.
Average thruput in lbs./hr.		100 lbs./hr.	150 lbs./hr.	200 lbs./hr.
Bin Capacity	Vacuum bin	0.15	0.20	0.30
Main dimensions in inches:	Height, with robot chute	51.2”		
	Width	20.5”	24.5”	28.5””
	Depth	27.50”		
Average machine weight in lbs.		510lbs.	530 lbs.	550 lbs.

2 Shipping Information

2-1 Unpacking and Inspection

You should inspect your Cumberland 6500 Series granulator for possible shipping damage. If the container and packing materials are in re-usable condition, save them for reshipment if necessary.

Thoroughly check the equipment for any damage that might have occurred in transit. In case of breakage, damage, shortage, or incorrect shipment refer to the following sections.

2-2 In the Event of Shipping Damages

Important!

According to the contract terms and conditions of the Carrier, the responsibility of the Shipper ends at the time and place of shipment.

- ☑ Notify the transportation company's local agent if you discover damage.
- ☑ Hold the damaged goods and packing material for the examining agent's inspection. Do not return any goods to Cumberland . before the transportation company inspection and authorization.
- ☑ File a claim against the transportation company. Substantiate the claim by referring to the agent's report. A certified copy of our invoice is available upon request. If the shipment was prepaid, call us for a receipted transportation bill.
- ☑ Advise Cumberland . regarding your wish for assistance and to obtain an RMA (return material authorization) number.

2-3 If the Shipment is Not Complete

Check the packing list. You should have:

- ☑ Cumberland. 6500 Series granulator
- ☑ Bill of lading for equipment shipped
- ☑ Operating and Installation packet
- ☑ Electrical schematic and panel layout drawings

Re-inspect the container and packing material to see if you missed any smaller items during unpacking. Determine that the item was not inadvertently taken from the area before you checked in the shipment. Notify Cumberland . immediately of the shortage.

2-4 If the Shipment is Not Correct

If the shipment is not what you ordered, **contact Cumberland. shipping department immediately**. For shipments in the United States and Canada, call 1 (800) 229-2919; for all other countries, call our international desk at (508) 399-3100. Have the order number and item number available.
Hold the items until you receive shipping instructions.

2-5 Returns

Important!

Do not return any damaged or incorrect items until you receive shipping instructions from Cumberland .

2-6 Uncrating

6500 Series Granulator

6500 Series granulators are shipped mounted on a wooden skid then blocked and banded to prevent movement. All non-painted items subject to corrosion are coated with a quality rust preventative and the machine is then covered with heavy duty polyethylene to protect it from moisture and dirt.

Cumberland granulators are normally shipped completely assembled unless the size of the machine or an agreement for special shipping arrangements causes partial disassembly.

If inspection revealed no shipping damage, unpack the unit by removing the polyethylene covering and banding. For detailed uncrating information, follow the instructions listed below:

1. Remove the nails holding the box to the skid and lift the box off carefully, avoiding staples in the 1' x 4' wood supports. Cut steel banding.
2. Use a pry bar to remove the blocks securing the unit to the skid.
3. Insert forks between skid and granulator from the side **(guard side)** until they protrude beyond the opposite side of the unit. The forks must be equidistant from the centerline of the unit and the unit must be balanced on the forks.
4. Lift the unit off the skid with a fork truck. Lift slowly and only high enough to clear the skid. Use a pry bar if necessary to **carefully** remove the skid from the unit.
5. Lower slowly. The unit should land on its casters or rails and can then be moved into position.
6. Temporary hardware has been installed to prevent side panels from shifting in transit. Remove hardware.

Important!

Retain the crating material for reshipping the granulator in case hidden shipping damage is found.

6500 Series Granulators

6500 Series Granulators are shipped mounted on a skid, enclosed in polyethylene, and open-crated on all four sides and top.

1. Pry the crating away from the skid.
2. Follow the instructions listed above.
3. Use a pry bar to remove the blocks securing the unit to the skid.
4. Lift unit from the sides (guard side) inserting forklift under the base into the lifting openings provided. Use a pry bar if necessary to **carefully** remove the skid from the unit.

CAUTION!

DO NOT attempt to lift the granulator by means of any shaft or protruding member, ESPECIALLY THE HOPPER

- Notes-

3 Installation

3-1 Scope

This section contains all instructions required for experienced installation personnel to install the Cumberland granulator and prepare it for production. It is essential to follow all instructions carefully and in the sequence presented. Be sure to observe all **DANGER**, **WARNING**, and **CAUTION** statements in order to prevent personal injury or machine damage, and to observe all **NOTE** statements which are designed to assist in the performance of procedures.

3-2 General

The site selected for installation of the granulator should be prepared in advance. Be certain that the area to be occupied by the machine is clean, level and free of obstructions. The site selected must have a floor rated to easily support the weight of the machine. A concrete floor of 4" minimum in thickness is recommended.

3-3 Set-up

Make certain the floor is clean, level, and free of obstructions before placing the machine into position.

Visually inspect the hopper infeed opening to insure that no stray packing material or debris are present.

Fastener (turn counter-clockwise to loosen)

Loosen the fastener in the front of the cutting chamber. Note that this fastener does not need to be completely removed from the upper cutting chamber as it is designed to be captive for convenience.

.

pull the cradle actuator towards the front of the machine apply lifting pressure to open the cutting chamber approximately 90^{o} (For more information on opening the cutting chamber refer to Section 4).

CAUTION!

The knives mounted on the rotor and also located at the edges of the cutting chamber are extremely sharp. Always wear heavy gloves and exercise care when working in the cutting chamber.

Wipe out the inside of the hopper and upper cutting chamber. Carefully inspect the interior of the cutting chamber for foreign material or debris. Slowly turn the rotor by hand to verify that it rotates freely and without obstruction or contact between the rotor and bed knives. Before closing the cutting chamber, check the chamber to insure that nothing has been left inside the machine. Rotate the hand crank counter-clockwise (towards the rear of the machine) until the cutting chamber is fully closed.

Lower the screen chamber until it comes to rest.

Remove the screens and place them on their side. Wipe out the screen chamber and transition. Once cleaned, place the screen back into position. Raise the screen chamber and tighten the (2) fasteners to hold the screen chamber and cutting chamber securely closed. Connect the fan transition (optional) or replace the bin to prepare the machine for operation. Position and connect any optional accessory equipment such as fans, conveyors, and separators. Ensure all tubing joints are securely clamped and supported.

Make certain all electrical connections are properly made and supported between accessories and the control enclosure. (Refer to the wiring diagrams for wire and terminal connections.)

Open the sheave guard (LH) by removing the fastener attaching the cover. Check the belts for proper tension and alignment (refer to Section 9-2). Upon completion, close the sheave guard by placing the cover back into position, insert all of the fasteners originally removed, and tighten them fully.

3-4 Electrical Service Connections

Carefully check the diagrams packed with the machine. All internal wiring has been done at the factory and safety interlocks have been verified for proper functioning before shipment. It is only necessary to connect the electrical power source to the machine at the control enclosure.

WARNING!

All equipment must be grounded in compliance with Article 250 of the National Electric Code. The customer's disconnecting means and branch circuit protection must also be in compliance with the National Electric Code and all Local Codes.

3-5 High Amperage Readings

NOTE: **Make sure the granulator is not drawing excessive amperage.**

1. Check appropriate amperage as listed on the motor nameplate.
2. Measure amperage with ammeter by connecting ammeter to incoming power feed wires. Make sure machine is not drawing more than amperage listed on the nameplate. The amperage will change according to motor size.
3. If amperage exceeds the amount listed on nameplate, check the following:
    - Sharpness of knives
    - Quoted feed rate of granulator

		HP	FRAME	PH3	HZ60	TYPE KM	
	LOW VOLTAGE LINE	VOLTS	AMPS	RPM	SERVICE FACTOR	NEMA CODE	TEMP RISE
	4 5 6	230/460	**Amperage**				
	Y	208					
		May not meet NEMA torque on 208V systems		BEARINGS DRIVE/OPP			
		NEMA DESIGN B	NEMA NOM. EFF.	SERIAL			
AC Motor	HIGH VOLTAGE LINE	CONT DUTY @	MAX AMB	INS	TV MADE IN USA		

4 Accessing Cutting Chamber

4-1 Opening Cutting Chamber

1. Allow material to run out of the cutting chamber.
2. Shut **OFF** and **LOCKOUT** all power, including the main disconnect switch.
3. If equipped with optional sound enclosure, open front doors.
4. Loosen fasteners on front of machine. They are designed to remain with the upper screen chamber.
5. from the back side of the hopper robot chute pull the hopper towards you and open the unit until it comes to a stop.

WARNING!

DO NOT USE ANY OTHER MEANS TO CRANK OPEN THE MACHINE OTHER THAN THE HAND CRANK PROVIDED. Using other methods of turning the jack will result in damage to the unit.

NOTE: The cutting chamber is designed to open 90° to access the knives, but can be left open at any position on the way up depending on the reason for opening. The jack screw is a self-locking acme screw that will not back travel.

CAUTION!

New or resharpened knives should be handled with extreme care. It is suggested that the sharp cutting edges be covered with tape to prevent damage to the knives or injury to personnel during installation.

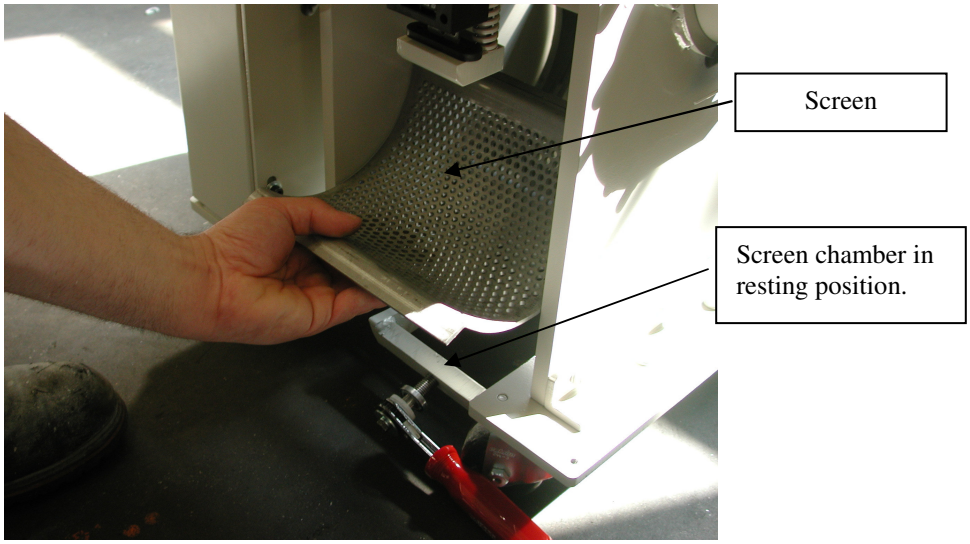
4-2 Closing Cutting Chamber

1. Double check the cutting chamber area for tools, rags, and other debris left in the area.
2. Close the cutting chamber
3. Raise screen cradle and tighten the fastener.
4. Tighten the fastener in the front of the cutting chamber.

5 Accessing Screen Chamber

5-1 Opening Screen Chamber

1. Allow all material to run out of the cutting chamber and screen chamber.
2. Shut **OFF** and **LOCKOUT** all power including the main disconnect switch.
3. Remove hopper located below the screen chamber.
4. Loosen the fastenerholding the screen cradle in position. As the fasteners are designed to remain with the screen chamber, it is not necessary to totally remove them from the screen chamber.
5. Guide the screen chamber to it's resting position.



WARNING!

DO NOT LET THE SCREEN CHAMBER DROP!! Guide cradle to it's resting position.

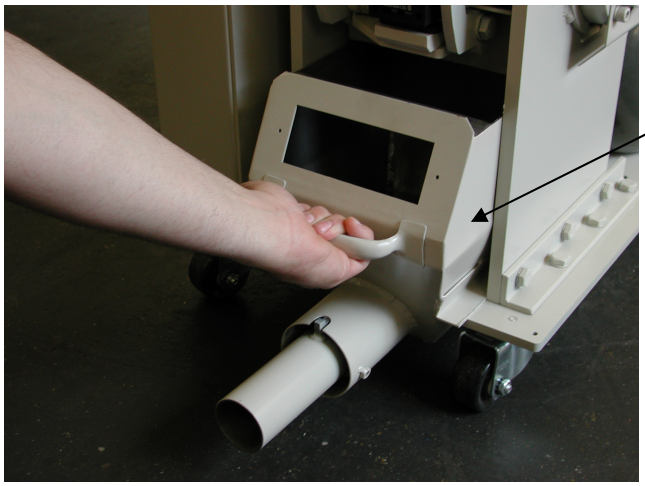
6. Remove the screen(s) and place them upright on their side.

CAUTION!

The knives mounted on the rotor, and the bed knives located at the edges of the cutting chamber, are extremely sharp. Always wear heavy gloves and exercise care when working in the cutting chamber.

5-2 Closing Screen Chamber

1. Ensure all tools, screws, and debris is removed from the inside of the screen chamber.
2. Place the screen back into its original position, ensuring it is fully seated within the cradle, then **CAREFULLY** raise the chamber to its closed position. Tighten the captive screws.
3. Insert hopper into the two clips located on either side of the unit walls (see photo).
4. Before leaving the area, make sure all components are connected properly.
5. Replace access cover and close doors on optional enclosures.



6 Sequence of Operation

6-1 Scope

This section contains the information required to carry out pre-operational procedures, and the checklist of items, which should always be reviewed prior to a production run.

DANGER!

Before undertaking any machine repairs or maintenance, always make certain that the machine disconnect switch is turned to the **OFF** position or that the control enclosure is disconnected from the main power source. Lock out all sources of power including the main disconnect switch and follow all of your plant lockout procedures.

6-2 Electrical Test

Before applying power to the machine, check the incoming voltage from L1 to L2, L2 to L3, and L1 to L3 (see the wiring diagram packed with the machine). The voltage should be the same as indicated on the silver tag in the control enclosure. If the voltage is not the same, contact the Cumberland Service Department for voltage modification instructions at 1-800-229-2919.

Once it has been determined the voltages are proper, it is necessary to start the motors and check for the proper direction of rotation.

- Turn the main disconnect switch to the **ON** position.
- Press the **granulator start** pushbutton to power the granulator motor. Visually compare the direction of the motor shaft rotation to the rotation arrow label (clockwise when viewed from the shaft end). If the motor turns in the opposite direction, reverse any two incoming power leads.

Once the rotation direction is correct, the remaining electrical controls need to be tested as follows:

- Press the **granulator stop** pushbutton and allow the machine to stop.
- For granulators equipped with conveyors, fans, etc., test their operation also by pressing the appropriate pushbutton. Check fan outlets for proper airflow.
- For granulators with **emergency stop** pushbuttons, test the buttons to insure all motion stops.
- Loosen the ORANGE fastener on the front of the cutting chamber and screen chamber to verify the safety interlock switch shuts the machine off.

-Notes-

7 Startup Checklist

7-1 Introduction

After all electrical and mechanical machine elements have been inspected and any defects corrected, the machine can be put into production once the start-up checklist has been referred to.

7-2 Fan Evacuation

Cumberland granulators can be supplied with an **optional** fan system to provide efficient, continuous evacuation of granulate from the machine. Cumberland offers a large variety of fan configurations. The following information is intended to be representative of the basic functioning and design of a fan, rather than being specific to one particular configuration. Please follow the instructions listed below for optimal fan operation, if your unit is equipped with this option.

7-3 Granulator Startup Checklist

- ☑ Have all installation and preparation instructions been read and followed?
- ☑ Have the granulator operator and all other necessary personnel been fully trained on machine operation and all safety mechanisms?
- ☑ Have sufficient location clearances been allowed?
- ☑ Has the equipment been grounded as required by local codes and/or Article 250 of the National Electric Code?
- ☑ Have all motors been checked for rotation?
- ☑ Have all machine controls, pushbuttons, and limit switch safeties been checked for proper functioning?
- ☑ Have the cutting chamber and screen chamber been checked for foreign matter?
- ☑ Have the drive belts and optional fan drive belts been checked for alignment and tension?
- ☑ Is the machine properly closed with all visible fasteners tight?

- ☑ Are all accessory components electrically and mechanically connected with proper support and with all fasteners tight?
- ☑ Are cyclonic air separator and filter units empty? (optional equipment)
- ☑ Has the fan (optional) been verified for proper rotation direction?
- ☑ Are all electrical enclosure boxes tightly closed and clamped shut?
- ☑ Are all personnel clear of the machine and optional fan?

8 Operation

8-1 Operation Instructions

1. **Prior to machine startup** -- All doors, covers, guards, and limit switches must be in place, securely fastened, and functional. All accessory components must be properly connected. If the granulator has a bin, make sure it is installed.
2. Turn the main disconnect to the ON position.
3. Start the granulator and fan (optional) by pressing the appropriate pushbutton at the operator station.
4. Load feedstock at a uniform rate that does not exceed the capacity of the machine.

NOTE: For color and/or material changes, allow all existing material to clear the granulator and it's downstream equipment before stopping the machine in order to minimize cleaning requirements.

Refer to Sections 4 and 5 for how to open the cutting chamber and screen chamber in order to obtain access to other machine areas for cleanout.

NOTE: If there is an access door on the hopper for inspection or cleanout purposes that is limit switch interlocked, make certain that the limit switch actuator bracket is re-installed and is properly in contact with the limit switch or the machine will not start.

8-2 Temporary Machine Stops

When temporarily stopping the machine, allow all material to run out of the cutting chamber. **NEVER** try to restart the machine with material remaining inside the cutting chamber.

8-3 Final Machine Stops

When shutting the machine down, allow all material to drop into the bin or pass through the fan and into the cyclonic air separator (optional) before pressing the granulator stop pushbutton.

8-4 Emergency Stops

Feedstock must be cleaned out of the hopper and cutting chamber prior to restarting the machine.

NOTE: The Cumberland 6500 Series granulators are not designed for small purging, chunks of solid plastic or other heavy wall cross-sectional pieces.

9 Routine Maintenance

9-1 Lubrication Specifications

9-1-1 Description

All Cumberland 6500 Series machines are equipped with rotor bearings that are prelubricated from the factory.

Mounting of the bearings on the Cumberland 6500 Series machines results in trouble free, low maintenance, and long lived bearing design.

The bearings used require a high quality, lithium based, extreme pressure (or EP) type of bearing, which conforms to NGLI Grade 2 consistency. This grease has been chosen due to its suitability for use in heavy-duty applications under heavy shock loads. It also contains rust inhibitors, has high temperature stability, and exhibits good water resistance.

Recommended Grease Product Names

Amoco	Amolith EP2
Castrol	EP2
Exxon	Ronex MP
Gulf	Crown #2
Mobil	Mobilith AW2
Shell	Alvania EP LF #2
Sunoco	Sunaplex #2
Texaco	Multifack EP2

NOTE: If necessary the bearings should be lubricated with care. Too much grease applied to the bearings at one time can rupture the bearing seals. .

9-2 Motor & Belts Servicing

The 6 ½ Series comes equipped with a self tensioning devise that constantly adjust an idle eliminating the need to tension the belt.

1. Verify that the alignment of the pulleys is correct. Utilizing a straightedge of sufficient length to span from one pulley to the other, place it along the sides of both pulleys. The entire edge of each pulley should fully contact the straightedge.

9-3 Knife Removal & Adjustment

NOTE: The rotor and bed knives are subjected to severe work and it is recommended they be inspected periodically for sharpness. The sharper the knives are kept, the better the machine will operate and the better the quality of granulate it will produce. Waiting until the knives have been severely rounded, chipped, or otherwise damaged will result in heavy shock loading during operation causing a subsequent reduction in knife life. For resharpening diagrams, refer to Figure 4.

1. Shut OFF and lockout all power including the main disconnect switch.

DANGER!

Before undertaking any machine repairs or maintenance, always make certain that the machine disconnect switch is turned to the **OFF** position or that the control enclosure is disconnected from the main power source. When extensive work is anticipated, either place a sign indicating that the main disconnect switch is to remain off on the switch or lock the switch to prevent accidental activation by someone unaware of work in progress.

2. Follow instructions in Section 4 on opening the cutting chamber.
3. See sketch in Section 10 for the general cutting chamber drawings.
4. Loosen the fasteners holding the bed knives, shims, and clamps, working from the knife edges inward to the center. **NOTE** the relative position of each part before they are removed.
5. As the last screw is backed out, the knife clamp, knife and shim will require some support to prevent them from moving.
6. Clean the bed knife seats thoroughly with a scraper and/or emery paper to remove any foreign material and rust.
7. Inspect the components and replace or resharpen as required.

9-4 Rotor Knife Removal

1. Carefully lock the rotor with locking pins to prevent it from turning.
2. Loosen the hex head rotor knife bolts and carefully remove all rotor knives.

3. Clean the rotor knife seats thoroughly with a scraper and/or emery paper to remove any foreign material or rust.
4. Inspect the knives and replace or resharpen as required.

9-5 Rotor Knife Sharpening

The rotor knives must be sharpened to within .003" (0.076 mm) of each other. Greater dimensional variations prevent the proper setting of the knife gap and may create other serious complications.

Grinding the cutting edge until it is free of nicks can be wasteful. It is not harmful to allow small nicks to remain in the cutting edge.

WARNING!

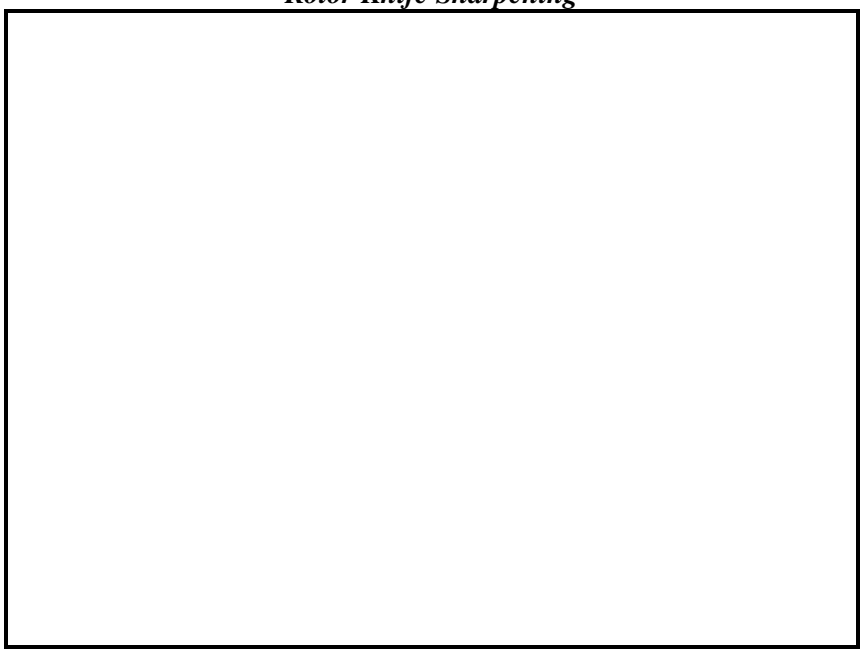
Do not install rotor knives that are smaller than the minimum dimension shown, because the fasteners that secure these knives may interfere with the cutting circle. The rotor will not be able to rotate and the knives will be damaged.

It is important to note that the minimum dimensions given for the rotor knife and bed knife cannot be combined simultaneously to produce a cutting combination.

NOTE: Replacement knife sets and knife resharpening services are available from Cumberland Engineering. Contact the Customer Service Department at (800) 229-2919.

Figure 3

Rotor Knife Sharpening



9-6 Recommended Knife Design Per Material

Table 4
Recommended Knife Replacement Blades

Material	Physical Material Quality	D2	
		High Shear	55°
ABS (High Imp't)	Energy Impt		X
ABS (Med. Imp't)	Energy Impt		X
ABS (Low Imp't)	Energy Impt	X	
ACETAL	Energy Impt		X
ACRYLIC	Energy Impt	X	
NYLON (Non-filled)	Energy Absb	X	
NYLON (Filled)	Friable	N/A	N/A
POLYBUTYLENE	Energy Absb	X	
POLYCARBONATE	Energy Impt		X
PET (Bottles)	Energy Impt	X	
PET (Preform)	Energy Impt	X	
POLYETHYLENE (PE. Low)	Energy Absb	X	
POLYETHYLENE (PE. Med.)	Energy Absb	X	
POLYETHYLENE (PE. High)	Energy Absb	X	

E.V.A.	Energy Absb	X	
POLYPROPYLENE (P.P)	Energy Absb	X	
POLYPROPYLENE OXIDE (P.V.D.C.)	Energy Absb	X	
STYRENE (G.P.)	Friable	X	
STYRENE (M ID)	Friable	X	
STYRENE (HI)	Energy Impt	X	
POLYSULFONE (GLS. REIN)	Friable		X
P.V.C. (Rigid)	Energy Impt	X	
P.V.C. (Flex)	Energy Absb	X	
PHENOLIC	Friable	N/A	N/A
TPR	Energy Absb	X	

9-7 Rotor Knife Installation

1. Carefully block the rotor with a piece of wood to prevent it from turning.
2. Re-install the rotor knives onto the rotor. Do not torque the hex head rotor knife bolts fully at this point -- snug them down only.

CAUTION!

New or resharpened knives should be handled with extreme care. It is suggested that the sharp cutting edge be covered with tape to prevent damage to the knives or injury to personnel during installation.

3. Check that the heel of the rotor knife is tight up against the knife seat. Utilizing a .003" feeler gauge, try to insert it between the heel of the knife and the knife seat at both ends and across the rotor knife. If the feeler gauge will not go down between the heel of the knife and the knife seat, the knife is installed correctly.
4. Torque down the rotor bolts. Start from the center of the knife and torque down the bolts equally, working towards the ends of the knife. Refer to Section 9-11 for the correct torque values based upon bolt sizes and thread pitch. After the bolts on each knife have been fully torqued, re-check with a .003" feeler gauge between the knife and seat. Use the same procedure on all remaining rotor knives.

9-8 Bed Knife Sharpening

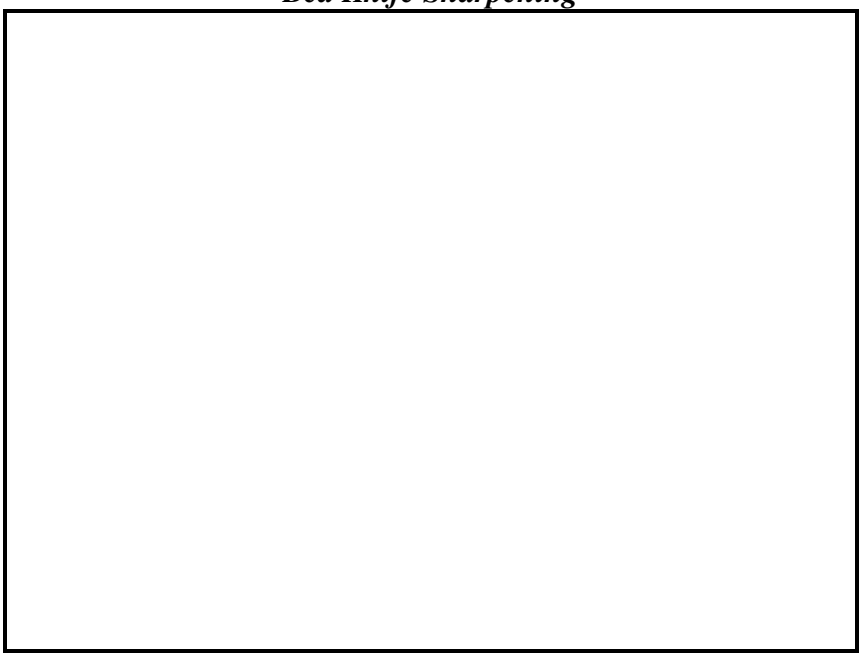
Each bed knife is provided with two (2) cutting edges. When the exposed edges become blunt, the knives can be turned over and repositioned to present the new cutting edges.

It is not necessary to grind bed knives to the closely matched tolerance of the rotor knives and as with the rotor knives small nicks in the cutting edges will not seriously affect knife cutting efficiency. Bed knives smaller than the minimum dimension shown must be replaced along with their fasteners.

It is important to note that the minimum dimensions given for the rotor knife and bed knife cannot be combined simultaneously to produce a cutting combination.

NOTE: Replacement knife sets and knife resharpening services are available from Cumberland Engineering. Contact the Customer Service Department at (800) 229-2919.

Figure 5
Bed Knife Sharpening



9-9 Bed Knife Installation & Setting

1. Install the new or resharpened bed knives, and clamps in the reverse of removal. Make sure the knives are fully back against the knife adjusting screws and loosen the adjusting screw checknuts slightly. Do not torque the socket cap screws fully at this point -- snug them down only.

CAUTION!

New or resharpened knives should be handled with extreme care. It is suggested that the sharp cutting edge be covered with tape to prevent damage to the knives or injury to personnel during installation.

2. Align a rotor knife with the primary bed knife, in the front of the granulator. With a .006" feeler gauge between the rotor and bed knife, start to adjust the bed knife into the rotor knife using the adjusting screw. During the movement of the bed knife, slowly rotate the rotor back and forth checking the clearance. The proper clearance will be established across the length of the knife when a slight "drag" is felt on the feeler gauge. Partially tighten the bed knife socket cap screws. Follow this procedure for all remaining bed knives.

3. If you find a “high” rotor knife, mark it and adjust to this knife.
4. Once knife adjustments are completed, equally and fully torque the bed knife cap screws, working from the center out towards the ends of the knife. Refer to Section 9-11 for the correct torque values based upon bolt size and thread pitch.
5. Re-check the clearance once the bolts have been fully torqued and reset if necessary.
6. Turn the rotor so that the knives are aligned with a secondary bed knife on the rear of the granulator and continue with the same procedure used to setup the primary bed knife.
7. After the clearance setting of both the primary and secondary bed knives is complete and checked, turn the rotor by hand to ensure that none of the rotor knives hit the bed knives.

8. Double check inside the machine to make sure no tools or other articles are left in the cutting chamber or have fallen into the screen area.
9. Close the cutting chamber and tighten the fasteners (refer to Section 4-2).

9-10 Preventative Maintenance Service

Follow a systematic preventative maintenance program to help avoid costly down time. Call the Cumberland Engineering Service Department to arrange a schedule of inspections. This service can be tailored to fit your maintenance requirements.

9-11 Recommended Torque For Knife Bolts

NOTE: For *Rotor* knife applications, use SEC Grade 8 hex head cap screws.
For *Bed* knife applications, use Series 1960 Grade 8 socket head cap screws.

Table 6
Recommended Bolt Torques (Metric)

METRIC SCREW SIZE	FT/LBS TORQUE (DRY)
M8	28
M10	54
M12	100
M14	155
M16	232
M18	340
M20	472
M24	610

**The above listed torque values are standard specifications.
***Metric Knife Bolt/Screw Tightening Torque for Grade 10.9 Fine Thread

10 Troubleshooting

Problem	Possible Cause	Solution
Motor/(optional) fan motor will not start.	No power.	Verify that the correct pushbuttons are being depressed and that the main disconnect switch is in the ON position.
	Fuses are blown.	Try to locate grounds, a locked rotor or other reasons.
		Replace fuses with the size and type shown on the wiring diagram (located in the control enclosure).
	Check for motor and fan overloads.	If required, reset #1 MOL, #2 MOL.
	If a limit switch is open.	Check the limit switches at the cutting chamber, screen chamber, and hopper cleanout doors. Ensure proper actuation and replace if required.
	If fan is hinged type design (optional)	Check safety limit switch to be sure it is making contact.
	If not equipped with fan	Check jumper on terminals #3 & #5.
	After completing above inspection, machine will still not start.	Call Service Department.
Machine stalls/(optional) fan stalls	Machine is overloaded with feedstock.	Reduce amount of feedstock put into machine per unit of time.
	Pieces of feedstock jammed in the rotor.	Clear the jammed material then visually inspect the rotor to ensure it is not damaged and that the knife gaps are correct.
Problem	**Possible Cause**	**Solution**

Machine stalls/(optional) fan stalls	Machine has loose or thrown belts.	Inspect, and if acceptable for use, reinstall and tighten per instructions.
	(Optional) Fan wheel is loose on shaft.	Tighten screws as required.
Excessive power required-blown fuses	Overloading of the machine	Reduce the amount of feedstock put into the machine per unit of time.
	Knives are dull	Sharpen or replace knives and reinstall.
	Knife gap is too large	Adjust knives to proper gap specification.
	Clearance between the rotor knives and screen is too small.	Check that the screen is properly seated in the screen chamber.
Bearings sound noisy or are excessively hot	Lack of lubrication	Lubricate per maintenance instructions (refer to Section 9-1)
	Overloading of the machine	Reduce the amount of feedstock put into the machine per unit of time.
	Bearings have exceeded their rated life.	Consult the Cumberland Service Department for replacement instructions.
Belts slip or squeal	Belts are too loose	Tighten per maintenance instructions.
	Overloading of the machine.	Reduce the amount of feedstock put into the machine per unit of time.
	Pulleys are not properly aligned.	Loosen and align as required.
	Machine has thrown belts.	Inspect, and if acceptable for use, reinstall and tighten per maintenance instructions.
Granulate builds up in the transition or tubing	Fan is too small	Replace with larger unit or fan wheel.
	Transition or tubing is clogged due to overloading of machine.	Reduce the amount of feedstock put into the machine per unit of time.
	Return air vents are covered or too small.	Ensure the vents are open.

Problem	Possible Cause	Solution

Granulate builds up in the transition or tubing	Fan wheel is loose on shaft.	Tighten set screws as required.
	Transition or cyclonic air separator tubing is clogged.	Clean as required.
	Fan is not evacuating properly.	Check for loose fan wheel on shaft, worn fan wheel, or loose drive belts.
Feedstock hangs up in the hopper or cutting chamber	Material being placed into the machine for processing is too large for the hopper, cutting chamber, or rotor diameter.	Reduce the initial size of the feedstock.
	Knives are dull.	Sharpen or replace knives and re-install.
	Overloading of the machine.	Regulate the infeed of scrap to uniformly feed the machine over an extended time period.
No granulate	Feedstock may be hung up inside hopper.	Shut the machine down and check.
	Screens are plugged.	Clean the screens.
	Fan is too small.	Replace with larger unit or fan wheel.
	Fan line may be clogged.	Clean as required.
	Fan wheel is damaged or worn.	Replace or repair as required.
	Fan tubing is not connected properly.	Connect as required.
Stringy granulate	Knife gap is too large.	Adjust knives to proper gap specifications.
	Knives are dull.	Sharpen or replace knives and reinstall.
	Overloading of feedstock.	Reduce the amount of feedstock put into the machine per unit of time.

Problem	Possible Cause	Solution
Fines	Knives are dull.	Sharpen knives (refer to Section 9) and re-install.
	Plastic is clogging the screens or transition, preventing proper fan evacuation.	Shut the machine down and clean.
	Rotor speed is too fast.	Change the pulleys.
	Screen size is too small.	Change to a screen with larger holes.

12 Spare Parts

12-1 Recommended Spare Parts

In order to reduce the amount of down time required to service a granulator, it is recommended that the following be kept in stock at your facility:

(1) set of rotor knives and bolts

(1) set of bed knives and bolts

(1) screen or set of screens, (depending if your model requires multiple screens)

(1) set of belts

(1) set of fuses

(1) set of motor starter heaters

(1) cyclone filter bag (optional)

12-2 Additional Parts

If additional spare parts are required for your granulator, please consult the Cumberland Spare Parts Express Department. The serial numbers of the specific components will be required when ordering parts from Cumberland.

NOTE: Refer to part numbers in the spare parts catalog when ordering replacement parts. Check the parts carefully as knives and screens generally have their numbers etched or stamped on them. The serial number of the machine will be required when ordering parts from Cumberland. This listing of recommended parts does not include all parts, which are available for purchase. The Cumberland Parts Department can be reached via a toll free number (**1-800-229-2919**).

Service Notes

Service Notes